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Practice Assessment Unit 1 Exam

1A & 1B For each quadratic below, give the coordinates of the vertex. Find the concavity, the width, and the axis of symmetry. Then, convert each quadratic into standard form.

1. $y = (x-7)^2 + 2$

Vertex: (7, 2)

Concavity: up

Width: normal

Axis of Symmetry: $x = 7$

2. $y = 4(x-3)^2 + 12$

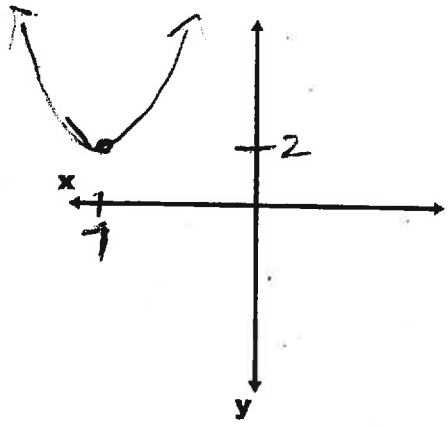
Vertex: (3, 12)

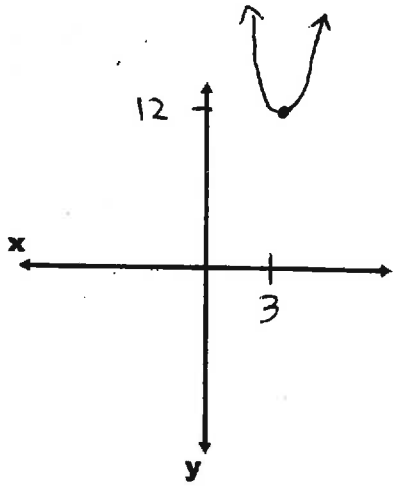
Concavity: up

Width: narrow

Axis of Symmetry: $x = 3$

1C Sketch what each equation above would look like on the axes below.





1D Write the following equations in **standard form.** **Hint: FOIL!

1. $y = (x-7)^2 + 2$

$y = (x-7)(x-7) + 2$

$y = x^2 - 7x - 7x + 49 + 2$

$y = x^2 - 14x + 51$

2. $y = 4(x-3)^2 + 12$

$= 4(x-3)(x-3) + 12$

$= 4(x^2 - 3x - 3x + 9) + 12$

$= 4x^2 - 12x - 12x + 36 + 12$

$y = 4x^2 - 24x + 48$

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1E Write the following standard form equations in **vertex form.** **Hint: Use your organizer!

	x	-4
x	x^2	-4x
4	-4x	16

$\frac{-8x}{2} = -4x$

$y = \frac{3x^2}{3} - \frac{24x}{3} - \frac{15}{3}$ $a = 3$

$y = 3(x^2 - 8x) - 15$

$y + 3(16) = 3(x^2 - 8x + 16) - 15$

$y + 48 = 3(x-4)^2 - 15$

$-48 \qquad -48$

$y = 3(x-4)^2 - 63$

$\frac{-2x}{2} = -1x$

	x	-1
x	x^2	-1x
-1	-1x	1

$y = \frac{-4x^2}{-4} + \frac{8x}{-4} - \frac{1}{-4}$ $a = -4$

$y = -4(x^2 - 2x) - 1$

$y - 4(1) = -4(x^2 - 2x + 1) - 1$

$y - 4 = -4(x-1)^2 - 1$

$+4 \qquad +4$

$y = -4(x-1)^2 + 3$

1F Write the following equations in **factored form.**

$y = x^2 + 12x + 32$

$y = (x+4)(x+8)$

	x	+4
x	x^2	4x
+8	8x	32

1 x 32
-1 x 32
2 x 16
-2 x -16
4 x 8
-4 x -8

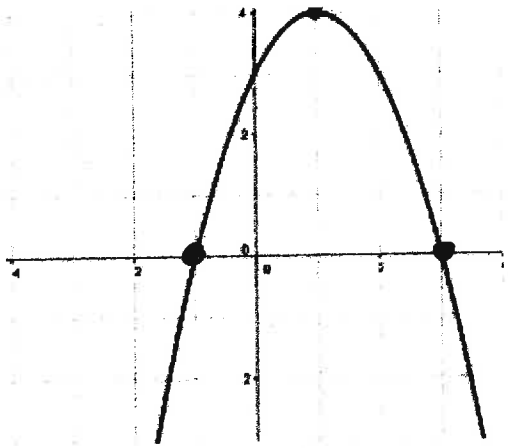
$y = x^2 + 3x - 10$

$y = (x+5)(x-2)$

	x	-2
x	x^2	-2x
+5	+5x	-10

1 x -10
-1 x 10
2 x -5
-2 x 5

1G Identify the **zeroes** of the following equations and graphs.



(-1, 0) (3, 0)

$(6x + 1)(x + 11)$

$6x + 1 = 0 \qquad x + 11 = 0$

$-1 \quad -1 \qquad -11 \quad -11$

$\frac{6x}{6} = \frac{-1}{6} \qquad x = -11$

$x = -\frac{1}{6}$

$\left(-\frac{1}{6}, 0\right) \quad (-11, 0)$

$-2(x-1)^2 + 18$

$0 = -2(x-1)^2 + 18$

$-18 \qquad -18$

$\frac{-18}{-2} = \frac{-2(x-1)^2}{-2}$

$\sqrt{9} = \sqrt{(x-1)^2}$

$\pm 3 = x - 1$

$3 = x - 1 \qquad -3 = x - 1$

$+1 \quad +1 \qquad +1 \quad +1$

$4 = x \qquad -2 = x$

(-2, 0) & (4, 0)

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1B The vertex of a parabola is at (1, 4) and has an x-intercept at (6,0). Write an equation for this parabola. (h k; x y)
**Hint: Solve for a!

$y = a(x-h)^2 + k$

$0 = a(6-1)^2 + 4$

$0 = a(5)^2 + 4$

$0 = 25a + 4$

$-4 \quad -4$

$\frac{-4}{25} = \frac{25a}{25}$ $\quad a = \frac{-4}{25}$

$$\boxed{y = \frac{-4}{25}(x-1)^2 + 4}$$

1E At a swim meet, Janet dives from a diving board that is 48 feet high. Her position above the water is represented by the equation h(t) = -16t^2+ 24t + 40, where t represents time in seconds and h(t) represents height in feet. What is Janet's maximum height and how long does it take her to get there? (time)

$h(t) = \frac{-16t^2}{-16} + \frac{24t}{-16} + 40$

$\frac{-1.5t}{2} = -.75t$

	t	$-.75$
t	t^2	$-.75t$
$-.75$	$-.75t$	$.5625$

$h(t) = -16(t^2 - 1.5t) + 40$

$h(t) - 16(0.5625) = -16(t^2 - 1.5t + 0.5625) + 40$

$h(t) - 9 = -16(t - 1.5)^2 + 40$

$+9 \qquad +9$

$h(t) = -16(t-1.5)^2 + 49$

t h(t)

vertex: (1.5, 49)

Janet's maximum height is 49 feet and she reaches it 1.5 seconds after she dives.

1H From the previous problem, how long does it take for Janet to hit the water?

$h(t) = -16(t-1.5)^2 + 49$ (height = 0)

$0 = -16(t-1.5)^2 + 49$

$-49 \qquad -49$

$\frac{-49}{-16} = \frac{-16(t-1.5)^2}{-16}$

$\sqrt{\frac{49}{16}} = \sqrt{(t-1.5)^2}$

$\pm \frac{7}{4} = t - 1.5$

$\pm 1.75 = t - 1.5$

$1.75 = t - 1.5$ $\quad +1.5 \quad +1.5$

$3.25 = t$

$-1.75 = t - 1.5$ $\quad +1.5 \quad +1.5$

$-0.25 = t$

It took Janet 3.25 seconds to hit the water after she dove.

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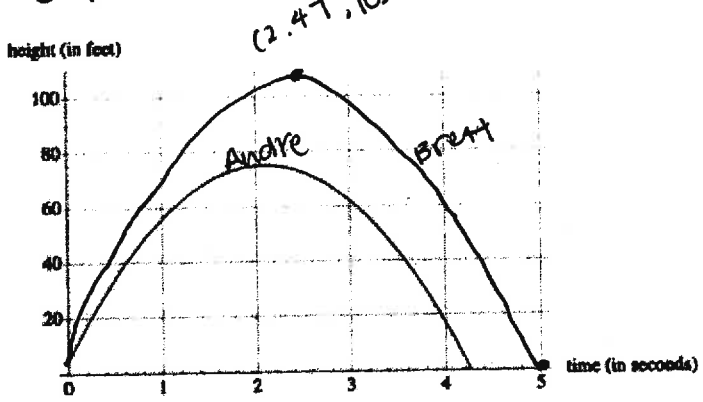
1H Suppose Brett and Andre each throw a baseball into the air. The height of Brett's baseball is given by

$$h(t) = -16t^2 + 79t + 6,$$

where h is in feet and t is in seconds. The height of Andre's baseball is given by the graph below:



Brett claims that his baseball went higher than Andre's, and Andre says that his baseball went higher.

a. Who is right? Brett's ball went higher. His went 103.5 ft while Andre's went only about 78 ft.

b. How long is each baseball airborne? Andre's ball was in the air for about 4.2 seconds and Brett's was in the air for 5.01 seconds

c. Construct a graph of the height of Brett's throw as a function of time on the same set of axes as the graph of Andre's throw (if not done already), and explain how this can confirm your claims to parts (a) and (b).

Brett's ball

$h(t) = -16(t^2 - 4.9375t) + 6$

	t^2	$-2.4688t$
t		
$-2.4688t$		6.094144

$t - 2.4688$

$h(t) + 16(6.095) = -16(t^2 - 4.94t + 6.095) + 6$

$h(t) - 97.5 = -16(t-2.47)^2 + 6$

$+97.5 \quad +97.5$

$h(t) = -16(t-2.47)^2 + 103.5$

vertex: $(2.47, 103.5)$

$t \quad h(t)$

when did it hit the ground?

$0 = -16(t-2.47)^2 + 103.5$

$-103.5 \quad -103.5$

$\frac{-103.5}{-16} = \frac{-16(t-2.47)^2}{-16}$

$\sqrt{6.4688} = \sqrt{(t-2.47)^2}$

$\pm 2.54 = t - 2.47$

$2.54 = t - 2.47$

$+2.47 \quad +2.47$

$5.01 = t$

$-2.54 = t - 2.47$

$+2.47 \quad +2.47$

$-0.07 = t$